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Title : Quantifying the Spatial and Temporal Risk of Baleen Whale Entanglement within the Stellwagen Bank National Marine Sanctuary

Category : Conservation

Student : Not Applicable

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Abstract : The Stellwagen Bank National Marine Sanctuary (SBNMS) is a 2,181 km² marine protected area located in the southwest Gulf of Maine. The area is heavily used by baleen whales, trap fisheries and gillnet fisheries, and entangled whales are frequently reported. From July 2001-June 2002, we conducted monthly surveys along tracklines that bisected the SBNMS at 5 km intervals. Sightings data were used to calculate the location of 414 baleen whales and 6,130 surface buoys that indicated the presence of subsurface fixed fishing gear. ArcView's (8.2) Kernel Density function (output raster cell size 100 m²; search radius 5000 m) was used to depict where sightings were concentrated and identify annual and seasonal areas of co-occurrence. To further investigate co-occurrence, we developed an index of Relative Interaction Potential (RIP) by creating a matrix of 5-minute grid cells that covered the SBNMS and, within each grid cell, multiplying whale sightings X buoy sightings. Cells were ranked by RIP to identify entanglement hot spots. To test the utility of the RIP, we plotted sightings of entangled whales relative to the RIP index. For the period July 2001-June 2002, all sightings of entangled whales from the SBNMS (n=3) occurred within or in the immediate vicinity of top-quartile cells. For the period 2000-2002, 85% (11/13) of entangled whales were found within or in the immediate vicinity of top-quartile cells. However, the tendency for the whale watching boats reporting entanglements to be found in the same areas and the ability of entangled whales to move away from the site of entanglement were confounding factors. We also attempted a preliminary quantification of the amount of line (trap fishery) and netting (gillnet fishery) that existed within the SBNMS. Conservative line estimates for the trap fishery ranged from 130 km (June) to 465 km (October). Netting estimates ranged from 37 km (March) to 99 km (June).